AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A modulation device for converting input data words of **p** bits into code words of **q** bits, concatenating adjacent ones of the code words with a merge bit sequence of **r** bits to form a code word sequence, and outputting the code word sequence, the modulation device comprising: ~~wherein~~

~~when the code word sequence is generated, the DSV of the code word sequence is controlled by inserting the merge bit sequence of r bits between the adjacent code words without conforming to at least one of a minimum run-length (d+1)T and a maximum run-length (k+1)T which are set on the basis of a run-length limiting rule RLL(d, k).~~

a modulation means for converting the input data words of **p** bits into the code words of **q** bits while prefetching at least a current code word and a next code word;

a merge bit inserting means for generating a plurality of code word sequences by temporarily concatenating the current code word and the next code word with each of a plurality of merge bit sequences of the **r** bits respectively to prepare a plurality of code word sequences without conforming to at least one of a minimum run-length (d+1)T and a maximum run-length (k+1)T which are set on the basis of a run-length limiting rule RLL(d, k);

a DSV value calculation means for calculating the DSV value of each of the large number of code word sequences as generated by the merge bit inserting means;

a comparing and selecting means for selecting one code word sequence having an absolute DSV value as calculated by the DSV value calculation means closest to zero among the large number of code word sequences; and

a final code word sequence output means for outputting a final code word sequence finally determined by concatenating the current code word and the next code word with the merge bit sequence which is inserted between the current code word and the next code word of the one code word sequence as selected by the comparing and selecting means,

wherein **d** is a minimum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, **k** is a maximum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, and **T** is a length of a channel bit.

2. (Currently Amended) The modulation device as claimed in claim 1 wherein ~~the DSV of the code word sequence is controlled by inserting~~ the merge bit inserting means inserts the merge bit sequence of **r** bits between the adjacent code words without conforming to the maximum run-length (k+1)T on the basis of the run-length limiting rule RLL(d, k) but permitting a maximum run-length of (k+2)T.

3. (Currently Amended) The modulation device as claimed in claim 1 wherein the merge bit inserting means generates the code word sequence ~~is output~~ not to conform to the run-length limiting rule RLL(d, k) for a ~~predetermined~~ period during which ~~is input~~ the modulation means inputs therein specific data as the input data ~~word~~ words ~~with which~~, the specific data being the input data words that would cause increase of particular frequency components ~~would appear~~ in a reproduced signal based on the code word sequence corresponding to the specific data if the merge bit inserting means generates the corresponding code word sequence ~~outputting~~ to conform to the run-length limiting rule RLL(d, k).

4. (Original) The modulation device as claimed in claim 3 wherein the specific data comprises alternating current signals or direct current signals which are not distinctively audible.

5. (Currently Amended) The modulation device as claimed in claim 3 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation means inputs therein the music information as the input code words including the specific data which is inserted to the gap of silence between adjacent performances of music and is not distinctively audible.

6. (Currently Amended) The modulation device as claimed in claim 3 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation means inputs therein the music information as the input code words including the specific data which is inserted to an area located within the gap of silence between adjacent performances of music but located outside of the area given the index number 00 and is not distinctively audible.

7. (Original) A recording medium on which is recorded the code word sequence encoded by the modulation device as recited in claim 1.

8. (Currently Amended) A modulation method for converting input data words of **p** bits into code words of **q** bits, concatenating adjacent ones of the code words with a merge bit sequence of **r** bits to form a code word sequence, and outputting the code word sequence, the modulation method comprising: ~~wherein~~

~~when the code word sequence is generated, the DSV of the code word sequence is controlled by inserting the merge bit sequence of r bits between the adjacent code words without conforming to at least one of a minimum run-length (d+1)T and a maximum run-length (k+1)T which are set on the basis of a run-length limiting rule RLL(d, k).~~

a modulation step of converting the input data words of **p** bits into the code words of **q** bits while prefetching at least a current code word and a next code word;

a merge bit inserting step of generating a plurality of code word sequences by temporarily concatenating the current code word and the next code word with each of a plurality of merge bit sequences of the **r** bits respectively to prepare a plurality of code word sequences without conforming to at least one of a minimum run-length (d+1)T and a maximum run-length (k+1)T which are set on the basis of a run-length limiting rule RLL(d, k);

a DSV value calculation step of calculating the DSV value of each of the large number of code word sequences as generated by the merge bit inserting step;

a comparing and selecting step of selecting one code word sequence having an absolute DSV value as calculated by the DSV value calculation step closest to zero among the large number of code word sequences; and

a final code word sequence output step of outputting a final code word sequence finally determined by concatenating the current code word and the next code word with the merge bit sequence which is inserted between the current code word and the next code word of the one code word sequence as selected by the comparing and selecting step,

wherein **d** is a minimum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, **k** is a maximum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, and **T** is a length of a channel bit.

9. (Currently Amended) The modulation method as claimed in claim 8 wherein ~~the DSV of the code word sequence is controlled by inserting~~ the merge bit inserting step inserts the merge bit sequence of **r** bits between the adjacent code words without conforming to the maximum run-length (k+1)T on the basis of the run-length limiting rule RLL(d, k) but permitting a maximum run-length of (k+2)T.

10. (Currently Amended) The modulation method as claimed in claim 8 wherein the merge bit inserting step generates the code word sequence ~~is output~~ not to conform to the run-length limiting rule RLL(d, k) for a ~~predetermined~~ period during which ~~is input~~ the modulation step inputs specific data as the input data ~~word~~ words ~~with which~~, the specific data being the input data words that would cause increase of particular frequency components ~~would appear~~ in a reproduced signal based on the code word sequence corresponding to the specific data if the merge bit inserting step generates the corresponding code word sequence ~~outputting~~ to conform to the run-length limiting rule RLL(d, k).

11. (Original) The modulation method as claimed in claim 10 wherein the specific data comprises alternating current signals or direct current signals which are not distinctively audible.

12. (Currently Amended) The modulation method as claimed in claim 10 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation step inputs the music information as the input code words including the specific data which is inserted to the gap of silence between adjacent performances of music and is not distinctively audible.

13. (Currently Amended) The modulation method as claimed in claim 10 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation step inputs the music information as the input code words including the specific data which is inserted to an area located within the gap of silence between adjacent performances of music but located outside of the area given the index number 00 and is not distinctively audible.

14. (Original) A recording medium on which is recorded the code word sequence encoded in accordance with the modulation method as recited in claim 8.

15. (Currently Amended) A modulation device for converting input data words of **p** bits into code words of **q** bits, concatenating adjacent ones of the code words with a merge bit sequence of **r** bits to form a code word sequence, and outputting the code word sequence, the modulation device comprising:

a modulation means for converting the input data words of **p** bits into the code words of **q** bits while prefetching at least a current code word, a next code word, and a further next code word;

a merge bit inserting means for generating a plurality of code word sequences by temporarily concatenating the current code word and the next code word with each of a plurality of merge bit sequences of the **r** bits respectively to prepare a plurality of code word sequences without conforming to the run-length limiting rule RLL(d, k), and then temporarily concatenating at least the further next code word and the next code word of each code word sequence with each of the plurality of merge bit sequences of the **r** bits to prepare a large number of code word sequences from the current code word to the further next code word without conforming to the run-length limiting rule RLL(d, k);

a DSV value calculation means for calculating the DSV value of each of the large number of code word sequences as generated by the merge bit inserting means;

a comparing and selecting means for selecting one code word sequence having an absolute DSV value as calculated by the DSV value calculation means closest to zero among the large number of code word sequences; and

a final code word sequence output means for outputting a final code word sequence finally determined by concatenating the current code word and the next code word with the merge bit sequence which is inserted between the current code word and the next code word of the one code word sequence as selected by the comparing and selecting means,

wherein **d** is a minimum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, and **k** is a maximum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits.

16. (Currently Amended) The modulation device as claimed in claim 15 wherein the merge bit inserting means inserts the merge bit sequence of **r** bits ~~is inserted~~ between the adjacent code words without conforming to the maximum run-length (k+1)T on the basis of the run-length limiting rule RLL(d, k) but permitting a maximum run-length of (k+2)T, in which **T** is a length of a channel bit.

17. (Currently Amended) The modulation device as claimed in claim 15 wherein the merge bit inserting means generates the code word sequence ~~is output~~ not to conform to the run-length limiting rule RLL(d, k) for a ~~predetermined~~ period during which ~~is input~~ the modulation means inputs therein specific data as the input data ~~word~~ words ~~with which~~, the specific data being the input data words that would cause increase of particular frequency components ~~would appear~~ in a reproduced signal based on the code word sequence corresponding to the specific data if the merge bit inserting means generates the corresponding code word sequence ~~outputting~~ to conform to the run-length limiting rule RLL(d, k).

18. (Original) The modulation device as claimed in claim 17 wherein the specific data comprises alternating current signals or direct current signals which are not distinctively audible.

19. (Currently Amended) The modulation device as claimed in claim 17 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation means inputs therein the music information as the input code words including the specific data which is inserted to the gap of silence between adjacent performances of music and is not distinctively audible.

20. (Currently Amended) The modulation device as claimed in claim 17 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation means inputs therein the music information as the input code words including the specific data which is inserted to an area located within the gap of silence between adjacent performances of music but located outside of the area given the index number 00 and is not distinctively audible.

21. (Original) A recording medium on which is recorded the code word sequence encoded by the modulation device as recited in claim 15.

22. (Currently Amended) A modulation method for converting input data words of **p** bits into code words of **q** bits, concatenating adjacent ones of the code words with a merge bit sequence of **r** bits to form a code word sequence, and outputting the code word sequence, the modulation method comprising:

a ~~first~~ modulation step of converting the input data words of **p** bits into the code words of **q** bits while prefetching at least a current code word, a next code word, and a further next code word;

a ~~second~~ merge bit inserting step of generating a plurality of code word sequences by temporarily concatenating the current code word and the next code word with each of a plurality of merge bit sequences of the **r** bits respectively to prepare a plurality of code word sequences without conforming to the run-length limiting rule RLL(d, k), and then temporarily concatenating at least the further next code word and the next code word of each code word sequence with each of the plurality of merge bit sequence of the **r** bits to prepare a large number of code word sequences from the current code word to the further next code word without conforming to the run-length limiting rule RLL(d, k);

a ~~third~~ DSV value calculation step of calculating the DSV value of each of the large number of code word sequences as generated in the ~~second~~ merge bit inserting step;

a ~~fourth~~ comparing and selecting step of selecting one code word sequence having an absolute DSV value as calculated in the ~~third~~ DSV value calculation step closest to zero among the large number of code word sequences; and

a ~~fifth~~ final code word sequence output step of outputting a final code word sequence finally determined by concatenating the current code word and the next code word with the merge bit sequence which is inserted between the current code word and the next code word of the one code word sequence as selected in the ~~fourth~~ comparing and selecting step,

wherein **d** is a minimum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, and **k** is a maximum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits.

23. (Currently Amended) The modulation method as claimed in claim 22 wherein the merge bit inserting step inserts the merge bit sequence of **r** bits ~~is inserted~~ between the adjacent code words without conforming to the maximum run-length (k+1)T on the basis of the run-length limiting rule RLL(d, k) but permitting a maximum run-length of (k+2)T, in which **T** is a length of a channel bit.

24. (Currently Amended) The modulation method as claimed in claim 22 wherein the merge bit inserting step generates the code word sequence ~~is output~~ not to conform to the run-length limiting rules RLL(d, k) for a ~~predetermined~~ period during which ~~is input~~ the modulation step inputs specific data as the input data ~~word~~ words ~~with which~~, the specific data being the input data words that would cause increase of particular frequency components ~~would appear~~ in a reproduced signal based on the code word sequence corresponding to the specific data if the merge bit inserting step generates the corresponding code word sequence ~~outputting~~ to conform to the run-length limiting rules RLL(d, k).

25. (Original) The modulation method as claimed in claim 24 wherein the specific data comprises alternating current signals or direct current signals which are not distinctively audible.

26. (Currently Amended) The modulation method as claimed in claim 24 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation step inputs the music information as the input code words including the specific data which is inserted to the gap of silence between adjacent performances of music and is not distinctively audible.

27. (Currently Amended) The modulation method as claimed in claim 24 wherein ~~when the specific data which is not distinctively audible is input for a predetermined period while~~ the input data words comprise music information, and the modulation step inputs the music information as the input code words including the specific data which is inserted to an area located within the gap of silence between adjacent performances of music but located outside of the area given the index number 00 and is not distinctively audible.

28. (Original) A recording medium on which is recorded the code word sequence encoded by the modulation method as recited in claim 22.

29. (Currently Amended) A modulation device for converting input data words of **p** bits into code words of **q** bits, concatenating adjacent ones of the code words with a merge bit sequence of **r** bits to form a code word sequence, and outputting the code word sequence, the modulation device comprising:

a modulation means for converting the input data words of **p** bits into the code words of **q** bits while prefetching at least a current code word, a next code word, and a further next code word;

a merge bit inserting means for generating a plurality of code word sequences by temporarily concatenating the current code word and the next code word with each of a plurality of merge bit sequences of the **r** bits respectively to prepare a plurality of code word sequences with the run-length limiting rule RLL(d, k) conformed, and then temporarily concatenating at least the further next code word and the next code word of each code word sequence with each of the plurality of merge bit sequences of the **r** bits to prepare a large number of code word sequences from the current code word to the further next code word with the run-length limiting rule RLL(d, k) conformed, wherein **d** is a minimum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, and **k** is a maximum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits;

a DSV value calculation means for calculating the DSV value of each of the large number of code word sequences as generated by the merge bit inserting means;

a comparing and selecting means for selecting one code word sequence having an absolute DSV value as calculated by the DSV value calculation means closest to zero among the large number of code word sequences; and

a final code word sequence output means for outputting a final code word sequence finally determined by concatenating the current code word and the next code word with the merge bit sequence which is inserted between the current code word and the next code word of the one code word sequence as selected by the comparing and selecting means, wherein

the modulation means inputs therein specific data ~~is input for a predetermined period~~ as

the input data words and encodes the input data ~~word~~ words including the specific data ~~is encoded~~ by the p-q modulation scheme, the specific data comprising alternating current signals or direct current signals which would cause a modulation device that prefetches only the next code word to output a code word sequence from which ~~includes~~ a reproduced signal including particular frequency components is reproduced.

30. (Currently Amended) The modulation device as claimed in claim 29 wherein ~~when the specific data which is not distinctively audible is input for the predetermined period while~~ the input data words comprise music information, and the modulation means inputs therein the music information as the input code words including the specific data which is inserted to the gap of silence between adjacent performances of music and is not distinctively audible.

31. (Currently Amended) The modulation device as claimed in claim 29 wherein ~~when the specific data which is not distinctively audible is input for the predetermined period while~~ the input data words comprise music information, and the modulation means inputs therein the music information as the input code words including the specific data which is inserted to an area located within the gap of silence between adjacent performances of music but located outside of the area given the index number 00 and is not distinctively audible.

32. (Original) A recording medium on which is recorded the code word sequence encoded by the modulation device as recited in claim 29.

33. (Currently Amended) A modulation method for converting input data words of **p** bits into code words of **q** bits, concatenating adjacent ones of the code words with a merge bit sequence of **r** bits to form a code word sequence, and outputting the code word sequence, the modulation method comprising:

a ~~first~~ modulation step of converting the input data words of **p** bits into the code words of **q** bits while prefetching at least a current code word, a next code word, and a further next code word;

a ~~second~~ merge bit inserting step of generating a plurality of code word sequences by temporarily concatenating the current code word and the next code word with each of a plurality

a ~~second~~ merge bit inserting step of generating a plurality of code word sequences by temporarily concatenating the current code word and the next code word with each of a plurality of merge bit sequences of the **r** bits respectively to prepare a plurality of code word sequences with the run-length limiting rule RLL(d, k) conformed, and then temporarily concatenating at least the further next code word and the next code word of each code word sequence with each of the plurality of merge bit sequences of the **r** bits to prepare a large number of code word sequences from the current code word to the further next code word with the run-length limiting rule ~~RLL~~ RLL(d, k) conformed, wherein **d** is a minimum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits, and **k** is a maximum number of successive 0's occurring between adjacent logic 1's in the code words of **q** bits;

a ~~third~~ DSV value calculation step of calculating the DSV value of each of the large number of code word sequences as generated in the ~~second~~ merge bit inserting step;

a ~~fourth~~ comparing and selecting step of selecting one code word sequence having an absolute DSV value as calculated in the ~~third~~ DSV value calculation step closest to zero among the large number of code word sequences; and

a ~~fifth~~ final code word sequence output step of outputting a final code word sequence finally determined by concatenating the current code word and the next code word with the merge bit sequence which is inserted between the current code word and the next code word of the one code word sequence as selected in the ~~fourth~~ comparing and selecting step, wherein

the modulation step inputs specific data ~~is input for a predetermined period~~ as the input data words and encodes the input data ~~word~~ words including the specific data ~~is encoded~~ by the p-q modulation scheme, the specific data comprising alternating current signals or direct current signals which would cause a modulation device that prefetches only the next code word to output a code word sequence from which ~~includes~~ a reproduced signal including particular frequency components is reproduced.

34. (Currently Amended) The modulation method as claimed in claim 33 wherein ~~when the specific data which is not distinctively audible is input for the predetermined period while~~ the input data words comprise music information, and the modulation step inputs the music information as the input code words including the specific data which is inserted to the gap of silence between adjacent performances of music and is not distinctively audible.

35. (Currently Amended) The modulation method as claimed in claim 33 wherein ~~when the specific data which is not distinctively audible is input for the predetermined period while~~ the input data words comprise music information, and the modulation step inputs the music information as the input code words including the specific data which is inserted to an area located within the gap of silence between adjacent performances of music but located outside of the area given the index number 00 and is not distinctively audible.

36. (Original) A recording medium on which is recorded the code word sequence encoded by the modulation method as recited in claim 33.